Tulsa Winch

DESIGN SERIES 001

RUFNEK 30

AND

MODEL 34

SERVICE MANUAL

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⚠ WARNING

FAILURE TO HEED THE FOLLOWING WARNINGS MAY RESULT IN SERIOUS INJURY OR DEATH.

The safety of the winch operator and ground personnel should always be of great concern, and all necessary precautions to insure their safety must be taken. The primary mover and the winch must be operated with care and concern for the equipment and the environment and with a thorough knowledge of the equipment and its performance capabilities must be understood. These general safety guidelines are offered, however local rules and regulations or national standards may also apply. Recommended references are, but not limited to, ANSI B30, OSHA 1910, AWS D 14.3, and SAE J706.

Additional information can be found at http://www.team-twg.com/TulsaWinch/

⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.
NOTICE	Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

Mounting:

Winch mounting must be secure and able to withstand the applied loads.

- The stability of the mounting system must be approved by a qualified person.
- All welding should also be done by a qualified person.
- Winch mount must be flat so as not to induce binding.
- The flatness must not exceed 1/16 inch across the mounting surface of the winch itself.

Guards must be placed on all open drives in the case of mechanical winches. Insure that all hydraulic hoses, valves and fittings are rated to winch manufacturer's operating pressures.

Relief valves should be set to winch manufacturer's specifications. Insure that all PTO's and drivelines are sized appropriately for the winch manufactures speed and torque specifications.

Operator:

Must read and understand the operating and service manual.
Both the **SERVICE MANUAL** and **OPERATING AND MAINTENANCE MANUAL** are available online at http://www.team-twg.com/TulsaWinch/

Must never lift or move people with this winch.
This winch is not designed or intended for any use that involves moving people.

Must stay clear of the load at all times.
Ground personnel should remain a safe distance from the load and winch cable at least 1 ½ times the length of cable measured from the winch to the load.

Must stay clear of the cable at all times.
A broken cable can cause serious injury or death.

Must avoid shock loads.
Shock loads can impose a strain on the winch that can be many times the design rating.

Must be aware of the fleet angle of the winch.
All loads should only be pulled with the load line perpendicular to the drum shaft, this is to avoid excessive stresses on the winch and will help prevent the cable from building on one side of the drum flange.

Must wear personnel protective equipment (PPE) if required.
Check the local, state and federal regulations for compliance.

Must insure that the drum clutch is fully engaged before hoisting.
A visual inspection of the drum clutch engagement is required before each winching operation.

Must rig all loads secure before winching.
Pull the load line taut and inspect the condition of load for stability.

Must inspect the drum brake if equipped.
The drum brake is not a load holding device it is design to prevent over spooling of the drum and causing bird nesting of the cable on the drum. Inspect the brake for wear of the lining and the actuation method.

Must inspect the load control brake.
These winches can be equipped with two (2) forms of dynamic braking. The worm brake is one method and is adjustable for pay-out load control. Before a load is handled the load should be pulled tight and stopped to check this brake. The second method is a hydraulic lowering control that is not field adjustable. The same method should be used to check this brake.

Operation:

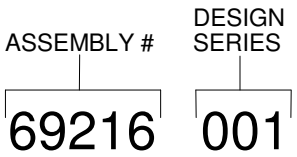
- All winch controls must be well marked for function to avoid confusion.
- Insure that the PTO is disengaged when the winch is not in use.
- All winch controls must be located to provide the operator with a clear view of the load.
- The clutch must be inspected daily for proper operation.
- The winch cable should be inspected daily for serviceability.
- A minimum of five wraps of tightly wound cable must remain on the drum.

GENERAL INFORMATION
INTRODUCTION AND THEORY OF OPERATION

The Tulsa worm gear winch is operated by turning the input of the worm using a hydraulic motor or PTO driven sprocket and chain. The winch utilizes the adjustable, spring applied, multiple disc oil brake that activates only during pay-out to provide maximum efficiency during pay-in. The torque is transferred from the gearbox through the drum shaft which is keyed to a mechanically actuated sliding clutch that when engaged transfers the torque to the drum.

ASSEMBLY NUMBER EXPLANATION

This manual is for design series 001. In the case of a major design change implementation, a new design series designation number will be issued for the winch. A new manual will also be created for that specific design series.



WINCH BREAK-IN

Winches, like any other kind of machinery, require a “break-in” to perform well and to maximize their life. The following guidelines should be used in the break-in of Tulsa Winches.

Use extreme care when first spooling cable onto the winch. DO NOT run the winch at high speeds when performing this operation. Make sure that the cable is payed-out in a straight line (to prevent kinks) and SLOWLY pay-in the winch to install the cable.

DO NOT exceed one half rated load or one half rated line speed for the first thirty minutes of operation. This will insure that the worm and gear have an opportunity to wear in properly. Periodically, check the gearbox for temperature rises and allow the winch to cool down between pulls. Worm gear winches are designed and intended for intermittent duty application only; using them in extremely long pulls may generate excessive heat and shorten the life of the winch.

MODEL CODES

NOTICE

THE RUFNEK 30 SERIES WINCHES ARE ONLY AVAILABLE WITH LEFT HAND GEARS.

RN30 W M R F O M X

Gear Type
- W=Worm
- P=Planetary

Drive Type
- H=Hydraulic
- M=Mechanical

Gearbox Position
- L=Left
- R=Right
- (viewed from rear of truck)

Input Shaft Location
- F=Front
- R=Rear
- X=Does not apply
- (viewed from rear of truck)

Cable Spooling
- O=Over Drum
- U=Under Drum
- (viewed from rear of truck)

Clutch Device
- M=Mechanical
- A=Air

Motor Type
1. Single Speed Gear Motor
2. Two Speed Gear Motor
3. Single Speed Geroler Motor
4. Two Speed Geroler Motor
5. Piston
6. Vane

X. No Motor

M34 S L R F O D CL

Winch Type
- M=Mechanical
- H=Hydraulic
- G=Speed Reducer

No. of Worm Starts
- S=Single
- D=Double
- T=Triple

Worm Angle
- L=Left
- R=Right

Gearbox Location
- L=Left
- R=Right
- (viewed from rear of truck)

Input Shaft Location
- F=Front
- R=Rear
- X=Does not apply
- (viewed from rear of truck)

Cable Spooling
- O=Over Drum
- U=Under Drum
- (viewed from rear of truck)

Motor Mount
- D=Direct Mount
- X=No Motor

Motor Type
- CL-CharLynn

MAINTENANCE

Tulsa Winch worm gear winches require regular maintenance to ensure safe and reliable operation. Regular oil changes with the correct oil for the ambient temperature conditions and an annual inspection of the wear components are strongly recommended.

Maintenance Scheduling

The owner is to ensure proper inspection intervals, in compliance with the API RP 2D Section 4, ANSI B30.5, 5-2.3, or ANSI B30.7, 7-2.1, and will review winch usage categories on a periodic basis. A qualified inspector should perform all maintenance and inspections.

USE (HRS PER MONTH)	API RP 2D RECOMMENDED INSPECTION SCHEDULE
0-10	PRE-USE, ANNUAL
11-50	PRE-USE, QUARTERLY
51+	PRE-USE, MONTHLY

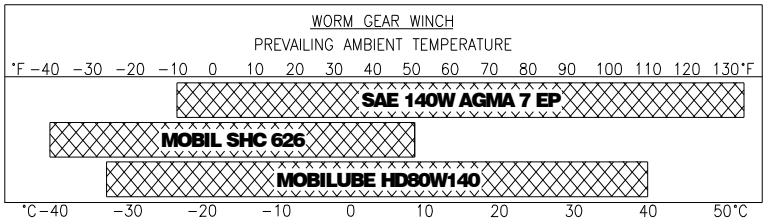
Oil Maintenance

The oil in the gear and brake section should be changed every **1000 hrs** or **6 months** of normal usage.

- Tulsa Winch recommends that the oil level in the gearbox be checked and adjusted as part of the pre-use inspection. If the oil level drops frequently or oil leakage is detected during an inspection, maintenance should be performed to correct any problems.

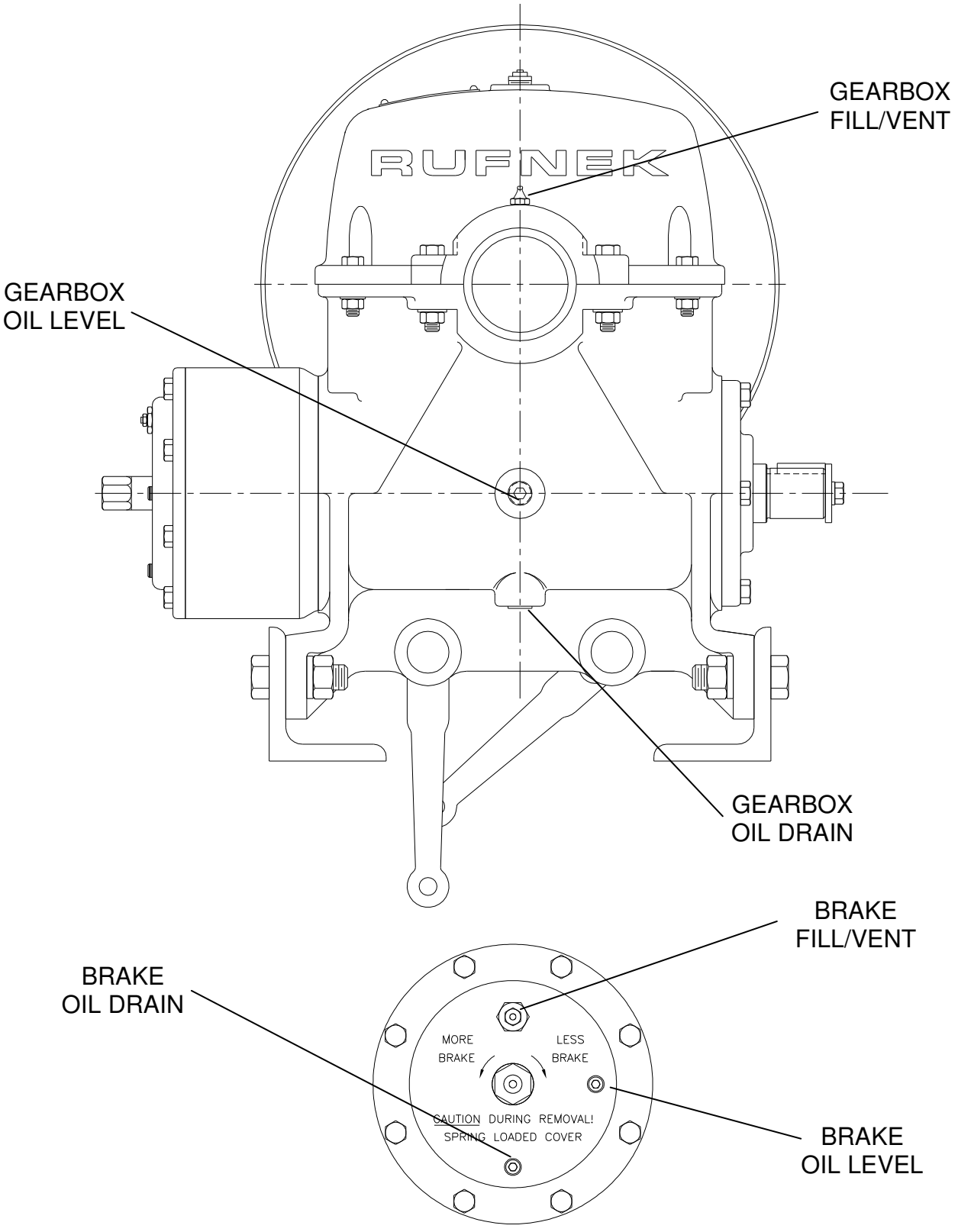
GEARBOX OIL CAPACITY = 3 QTS

- Gearbox oil level inspection is achieved by removing the oil level inspection plug and visually inspecting the oil level. Minimum oil level is to the bottom of the threads of the inspection hole. Refer to the chart below for the recommended oil type and grade for your application.



All oils must meet MIL-PRF2105E standards. Substitution from a reputable manufacturer is allowed as long as type and grade are maintained.

OIL LEVELS

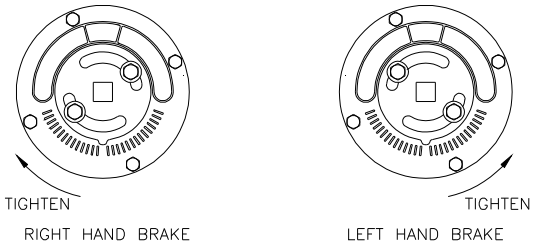

GEARBOX
FILL/VENT
RUFNEK
GEARBOX
OIL LEVEL
GEARBOX
OIL DRAIN
BRAKE
FILL/VENT
BRAKE
OIL DRAIN
MORE
BRAKE
LESS
BRAKE
CAUTION DURING REMOVAL!
SPRING LOADED COVER
BRAKE
OIL LEVEL

BRAKE ADJUSTMENT

In general, worm brakes on Tulsa winches should be set to hold the load you are currently working with. Excessive brake torque will result in excessive heat generation and brake wear. The best way to insure proper brake adjustment is to pull the cable tight against the load and stop to ensure the brake holds. If it doesn't, tighten the brake slightly and try it again. If the brake doesn't respond to adjustment the brake must be serviced.

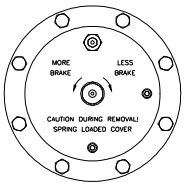
If the input to the winch is accessible and a torque wrench can be adapted to it, the brake can be set with a torque wrench. The Model 34 brake is shipped from the factory pre-set at 70 Ft.-Lbs.

ADJUSTABLE SHOE BRAKE



To tighten the brake, loosen the two capscrews in the slotted holes and rotate the brake in the direction shown. If the brake needs to be reversed, remove those same two capscrews, rotate the cam 60 degrees and reinstall the capscrews in the other set of holes which have just been revealed. After adjustment, be sure to re-tighten the cam capscrews securely.

ADJUSTABLE MULTIPLE DISC OIL BRAKE
RN30W



This style of brake can be adjusted by turning the hex adjuster counter-clockwise to increase brake and clockwise to decrease brake. The direction of braking for all multiple disc brakes can be changed by removing the cam clutch, turning it over, and re-installing it. For detailed service instructions, contact your Tulsa Winch distributor or the factory.

If the input to the winch is accessible and a torque wrench can be adapted to it, the brake can be set with a torque wrench. The RN30W brake is shipped from the factory pre-set at 70 Ft.-Lbs.

DISASSEMBLY

RUFNEK 30 BRAKE DISASSEMBLY

1. Remove the bottom drain plug (100) to drain oil from brake.

2. Loosen the spring tension inside the brake by rotating the adjusting nut (97) clockwise until it stops.

⚠ CAUTION

Extreme care should be taken when removing the brake cover. The cover is spring loaded against the cover screws.

3. Evenly remove the capscrews (94) from the brake cover (96).

4. Remove the spring (105). Remove the brake driver (101) along with the brake components (93, 103, 104, 106, and 107).

5. Inspect parts as follows, replace if necessary:

   A. Inspect the friction discs (104) for uneven or excessive wear. Friction discs should measure no less than .055-in thick.

   B. Inspect the stator plates (103) for warpage or excessive damage.

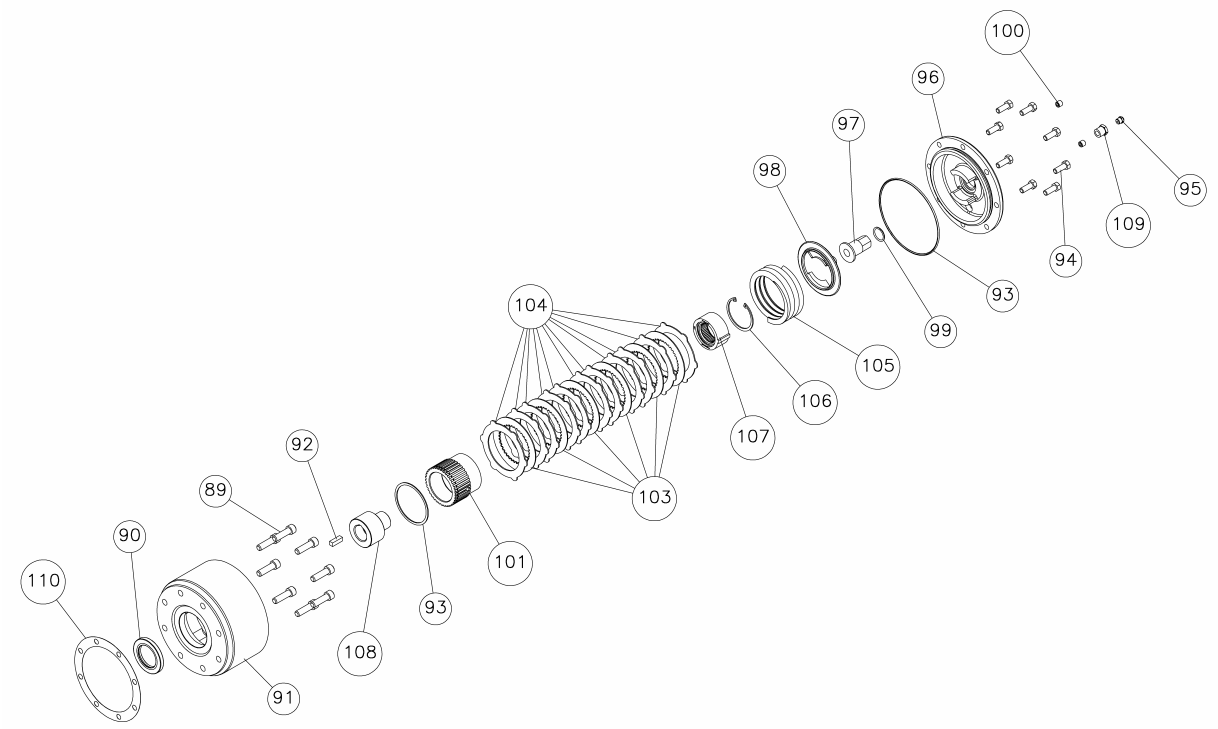
   C. Inspect the spring (105) for damage or discoloration.

   D. Cam clutch (107) should be free of debris and have all cams intact.

NOTICE

If replacing the cam clutch (107), take note of the direction it locks up for reassembly.

   E. Check coupler (108) for signs of pitting, spalling, or excessive wear.



MODEL 34 BRAKE DISASSEMBLY

1. Loosen the capscrews (26).

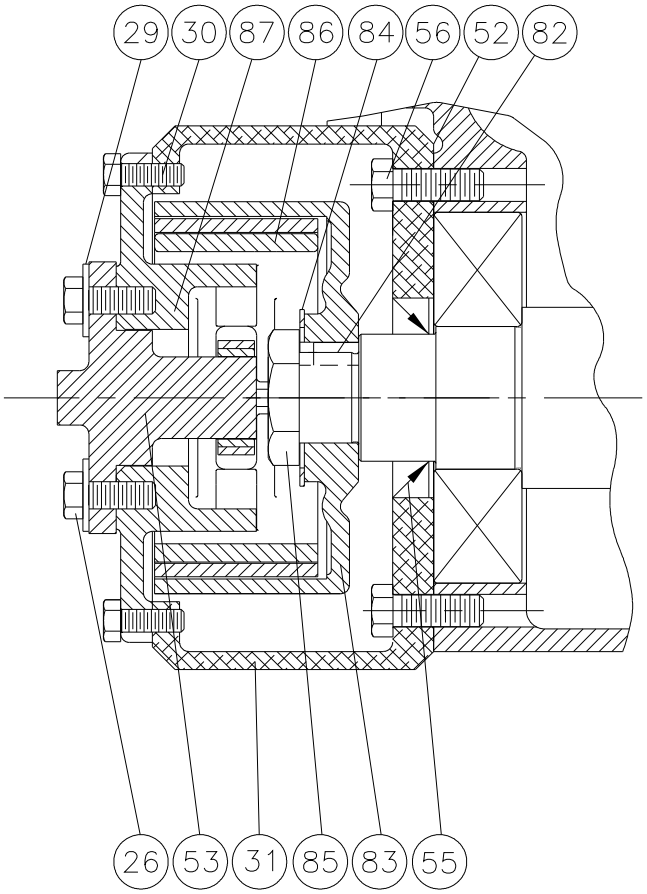
2. Remove the capscrews (30) from the cover (87).

3. Remove the cover (87) from the brake housing (31).

4. Remove the brake shoes (86).

5. Remove the nut (85) and washer (84).

6. Use the two threaded holes in the brake drum (83) and a gear puller to remove the brake drum.



7. Inspect parts as follows, replace if necessary:

   A. Inspect the brake shoes (86) for wear. If the shoe linings are worn flush with the rivet heads, they must be replaced.

   B. Inspect the brake drum (83) for severe wear or scoring.

   C. Check the inside lower part of the brake housing (31) for the presence of oil. Replace the seal (55) if oil is present.

NOTICE

If replacing the seal (55), first drain the oil from the gearbox then remove the capscrews (56) and brake housing (31).

CLUTCH AND DRUM DISASSEMBLY

1. Remove the rod (44) by removing the cotter keys (43).

2. Remove the arms (34) by removing the capscrews (46), nuts (24), and washers (23) holding the arm in place.

3. Remove the line shafts (35) by loosening the set screws in the collars (38) and the setscrews (42) in the arms (45) & (27).

4. Remove the capscrews (59), nuts (63), and washers (62) attaching the end bracket (6) to the frames (65 & 66).

5. Remove the end cap (5) by removing the four capscrews (3), nuts (20), and washers (19).

6. Remove the end bracket (57), yoke assembly (items 7, 16, 19, 20, 39, 40, 41) or clutch position indicator assembly (109), and sliding clutch (55).

7. Remove the keys (67) and collar (10) from the shaft (68) by loosening set screw (9).

8. Remove the brake band assembly (8) by loosening the nuts on the rod (21) to remove tension on the spring (22). Then, remove the cotter key (32) & pin (33) attaching clevis (28) to control arm (27). Finally, remove the capscrews (16), washers (23), and nuts (24) attaching the brake band to the frame.

9. Slide the drum (14) off of the output shaft (68) using an overhead hoist.

10. Inspect parts as follows, replace if necessary:

    A. Inspect the bushing (2) in the end bracket (6) for excessive wear.

    B. Inspect the keys (67), sliding clutch (11), and collar (10) for damage. See page 22 for clutch inspection.

    C. Inspect the brake band (8) and verify the band and lining is at least .225-in thick.

    D. Inspect the drum bushings (60) for wear or damage.

    E. Inspect the line shafts & linkage for excessive damage or wear.

GEARBOX DISASSEMBLY

1. Supporting the end of the shaft (68), remove the cover (76) by removing capscrews (46 and 78), nuts (20 and 24), and washers (19 and 23).

2. Lift the shaft (68), bushings (69), keys (70), and gear (assembled items 71, 72, 73, 74, 75, 80, and 81) out of the housing (61). Remove the bushings (69) from the shaft (68).

3. Remove the gear (75) from the carriers (72) by removing the twelve capscrews (71), nuts (81), and washers (80), then pull the carrier (72) off of the shaft (68). Finally, remove the spacer (73), carrier (72) and keys (70).

4. Remove the worm (57) from the housing (61) by removing either the motor (116) and motor adapter (112), or just the end cap (51), depending on the type of drive.

5. From the brake end, push the worm (57) out of the housing (61). If the brake has not been removed, see brake disassembly on page 9 or 10.

6. Inspect parts as follows, replace if necessary::

   A. Inspect the carriers (72) for damage.

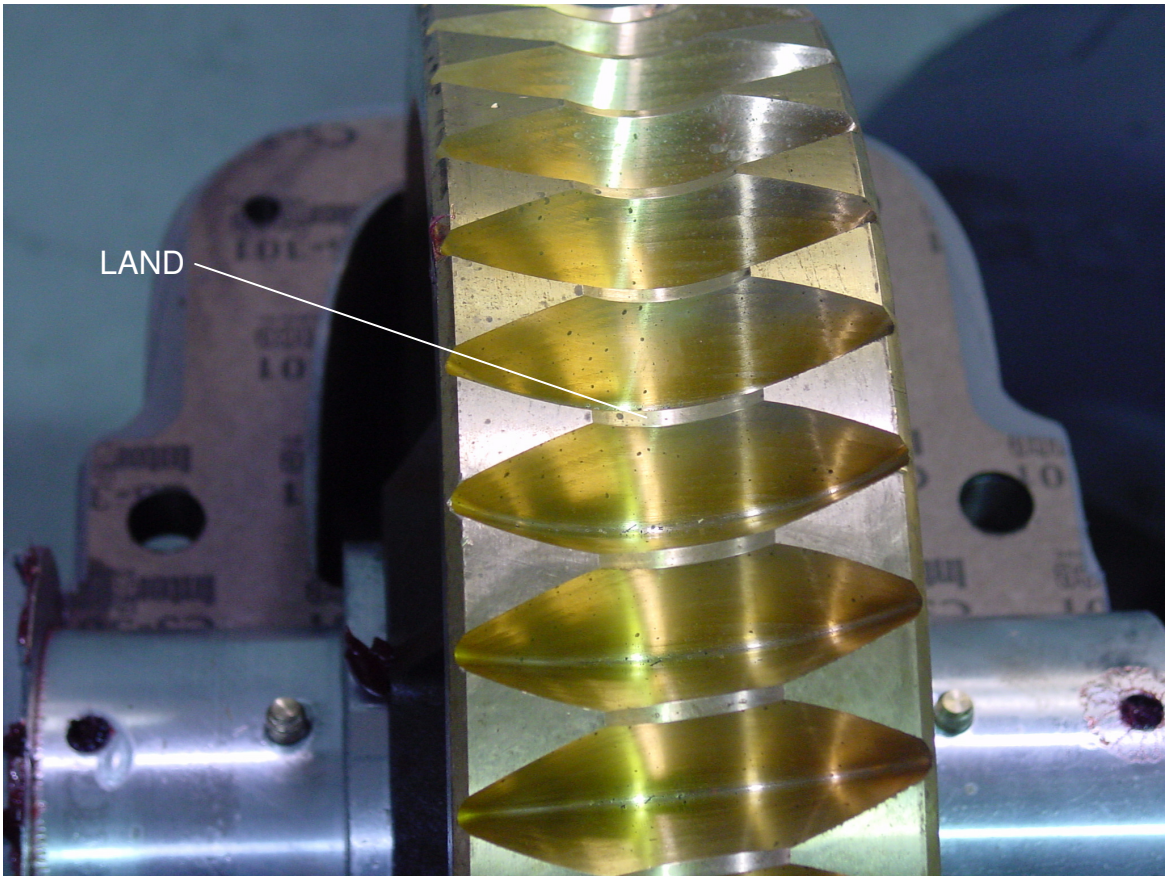
   B. Inspect the gear (75) for excessive wear or damage. See page 13 for detailed instructions.

   C. Inspect the keys (70) and bushings (69) for damage.

   D. Inspect the worm (57) for excessive wear or signs of heat checking or cracks.

   E. Inspect the bearings (54) and seals (55) for excessive wear or damage.

GEAR INSPECTION INSTRUCTIONS



Check gear wear by removing the cover and visually inspecting the bronze gear. If the gear is worn such that there is no visible land on the throat of the gear between the gear flanks as shown in picture above the gear should be replaced.

ASSEMBLY
GEARBOX ASSEMBLY

1. Press the bearings (54) onto the worm (57) then install the worm and bearings into the housing (61).

2. **For winches driven by a hydraulic motor:**
   Press a new oil seal (55) into the motor adapter (112). Install the gasket (52). Attach the motor adapter (112) to the housing (61) with six capscrews (89) using gasket (52). Install the motor (116) with two capscrews (114) and washers (115), using gasket (113).

   For winches driven by a PTO sprocket and chain:
   Press a new oil seal (55) into the end cap (51). Attach the end cap (51) to the housing (61) with six capscrews (56) using gasket (52).

3. Install the keys (58) into the output shaft (68).

4. Slide the carrier (72) over the keys (70). Install the spacer (73) using the two pins (74). Slide the gear (75) and the other carrier (72) onto the shaft and secure with eighteen capscrews (71), nuts (81), and washers (80).

5. Install the assembled gear onto the shaft (68). Slide the bushings (69) on to both ends of the shaft (68).

6. Install the output shaft assembly into the housing (76).

7. Install both gaskets (79) onto the housing. Attach the cover (76) to the housing (61), using capscrews (46 & 78), nuts (19 & 20), washers (19 & 23), using gaskets (79).

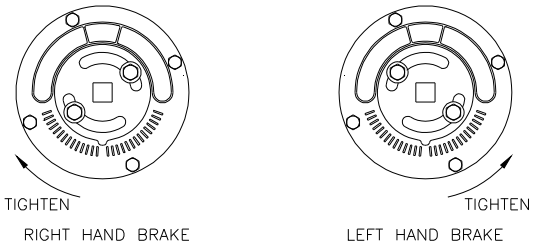
8. Fill the gearbox and brake with the proper oil. Refer to the maintenance section of this manual for correct oil type and amount.

MODEL 34 BRAKE ASSEMBLY

1. Press the oil seal (55) into the brake housing (31). Attach the brake housing (31) to the gearbox with six capscrews (56) using gasket (52).

2. Install the brake drum (83) and key (82) onto the worm shaft (57). Secure the brake drum with the nut (85) using the lock washer (84). Bend two tabs of the washer (84) over the flats of the nut (85).

3. If removed, reattach the cam (53) to the brake cover (87) in the orientation needed for your application using two capscrews (26) and washers (29).



4. Install the brake cover (87), cam (53), and brake shoes (86) into the brake housing (31).

5. Secure the brake cover (31) using four capscrews (30).

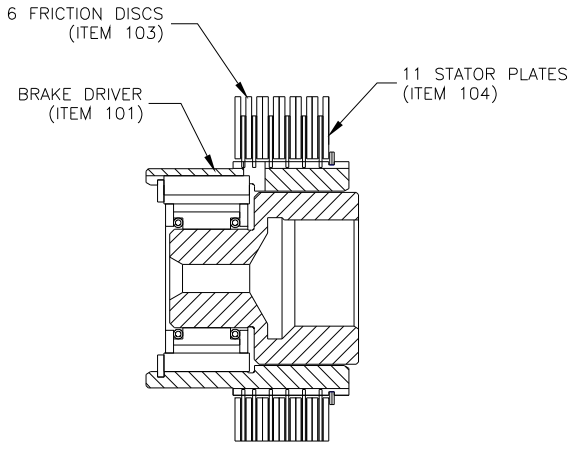
6. Adjust the brake using the procedure on page 8 of this manual.

RUFNEK 30 BRAKE ASSEMBLY

1. Press the oil seal (90) into the brake housing (91). Attach the brake housing to the gearbox with eight capscrews (89) using gasket (110).

2. Install the key (92) and coupler (108) onto the worm. Next, install the clutch/driver assembly (Items 93, 101, 106, and 107), onto the coupler (108).

3. With the retaining ring (93) on the clutch driver (101). Install the stator plates (104) and friction discs (103), as shown below.



4. Install the spring (105).

5. Install the adjusting nut assembly (assembled items 97, 98, and 99) into the brake cover (96) and attach the brake cover to the housing (91) with eight evenly installed capscrews (94).

6. Install the drain plug (100) into the bottom of the brake cover (96).

7. Fill gearbox and brake with proper oil. Refer to winch maintenance section of this manual for oil type and amounts.

8. Adjust the brake using the procedure on page 8 of this manual.

CLUTCH AND DRUM ASSEMBLY

1. Install bushings (60) into drum (14). Install the drum (14) onto the output shaft (68).

2. Install the collar (10). Tap the keys (67) into the output shaft.

3. Install the sliding clutch (11) and end bracket assembly onto the shaft (68), lining up the yoke with the grooves in the sliding clutch (11). Attach the end bracket to the frame using four capscrews (59), washers (62), and nuts (63).

CLUTCH POSITION INDICATOR ADJUSTMENT

(FOR RUFNEK WINCHES ONLY)

Make sure that the sliding clutch (11) is fully engaged and that the yoke assembly (111) is not binding on the drum clutch. The lugs of the yoke MUST be centered in the groove with the clutch fully engaged in order for the clutch position indicator to be properly adjusted (See FIG-1).

The switch is a normally-open electrical switch that is actuated by disengaging the clutch which closes the circuit.

With the clutch fully engaged, adjust the switch in until the warning device is activated, then back-out 1/4 turn to deactivate the warning device.

Tighten the jam nut against the clutch bracket to secure the adjustment.

Test the switch by fully engaging, then disengaging, the clutch. The warning device should activate while disengaging the clutch pivoting no more than 3°.

FIG.-1

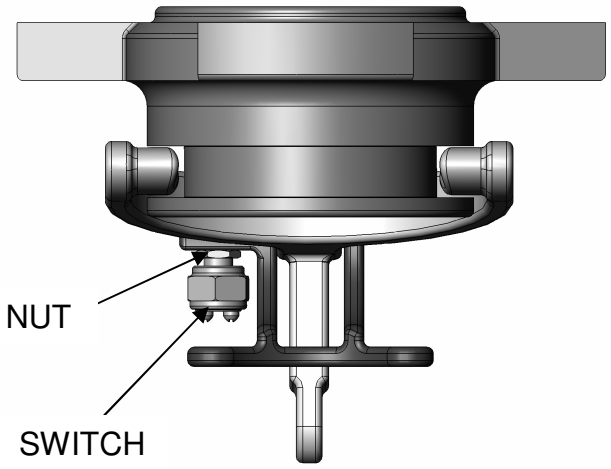
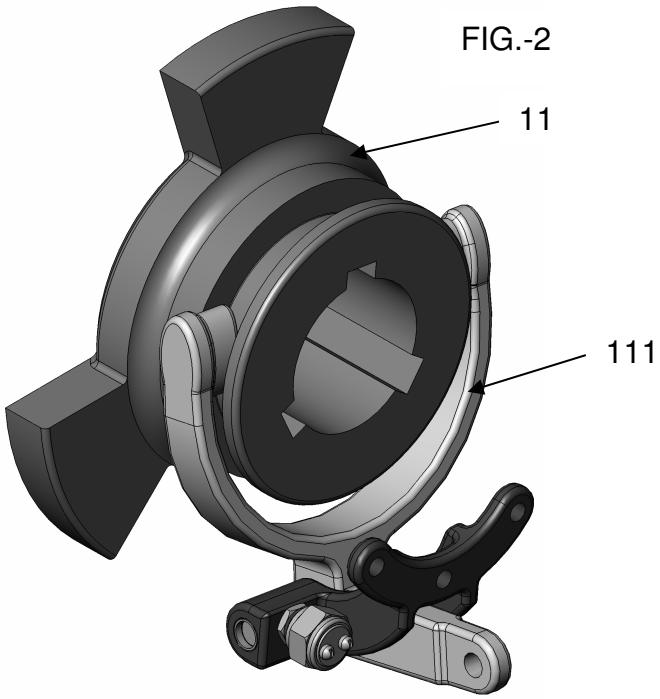


FIG.-2



TROUBLESHOOTING

FAILURE	PROBABLE CAUSE
Clutch handle won't latch	a) Clutch jaws aren't aligned. Align the jaws by rotating drum. b) Damaged yoke or linkage. Replace the yoke or clutch
Oil leaks from housing	a) Seal damaged or worn. Replace the seal(s). b) Too much gearbox oil. Drain excess oil. c) Gasket is worn. Replace gasket.
Load drifts	a) The brake is out of adjustment or worn. Adjust brake until load doesn't drift. Replace the parts as required.
Winch runs too slow	a) Low flow rate. Check the flow rate and increase if necessary. b) Hydraulic motor worn out. Replace the motor.
Cable drum won't free spool	a) Winch not mounted squarely. Check mounting and confirm that the winch is mounted on a level surface. b) Clutch not disengaged. Disengage the clutch.
Hydraulic fluid leaks from the vent in the gearbox	a) Damaged motor shaft seal. Replace the seal.
Winch won't pick up heavy loads.	a) Too much cable on the drum. Use the snatch block or remove some cable from the drum. b) System pressure too low. Increase the hydraulic system pressure. c) Winch not broke-in. Run winch at half of rated load for several pulls.

BILL OF MATERIAL

BOM DATED SEPTEMBER 2005

SEQ	QTY	P/N	DESCRIPTION
1	3	20517	PIN
2	1	32842	BUSHING
3	4	20266	CAPSCREW
4	5	21128	GREASE ZERK
5	1	20053	END CAP
6	1	20256	BRACKET
7	1	20129	BRACKET
8	1	1741	BRAKE BAND ASSEMBLY
9	2	20515	SET SCREW
10	2	20096	WASHER
11	1	20262	SLIDING CLUTCH
12	1	23598	DRUM CLUTCH
13	6	20407	CAPSCREW
14	1	23595	DRUM
15	1	21154	U BOLT
16	5	20270	CAPSCREW
17	--	--	OMIT
18	--	--	OMIT
19	8	20518	LOCKWASHER
20	9	20267	NUT
21	5	20521	NUT
22	1	20958	SPRING
23	16	20526	LOCKWASHER
24	15	20271	NUT
25	1	20112	ROD
26	2	20522	CAPSCREW
27	1	20094	ARM
28	1	20054	CLEVIS
29	4	20617	WASHER
30	4	28578	CAPSCREW
31	1	21365	HOUSING
32	1	20514	COTTER PIN
33	1	939243	CLEVIS PIN
34	2	20070	ARM
35	2	20282	SHAFT
36	--	--	OMIT
37	4	20193	SET SCREW
38	4	20230	COLLAR
39	1	20264	YOKE
40	2	24724	SNAP RING
41	1	20116	PIN

BILL OF MATERIAL CONTINUED

SEQ	QTY	P/N	DESCRIPTION
42	2	20737	SET SCREW
43	2	20474	COTTER PIN
44a	1	20111	RIGHT HAND ROD
44b	1	20113	LEFT HAND ROD
45	1	20072	ARM
46	10	20276	CAPSCREW
47	1	20284	BRACKET
48	4	20105	KEY
49	1	20278	CAPSCREW
50	1	20092	WASHER
51	1	21542	CAP
52	2	20118	GASKET
53	1	23875	CAM
54	2	20303	BEARING
55	2	20281	OIL SEAL
56	16	30205	CAPSCREW
57a	1	21641	RIGHT HAND WORM (M34)
57b	1	21640	LEFT HAND WORM (M34)
57c	1	44068	MECHANICAL WORM (RN30)
57d	1	44070	HYDRAULIC WORM (RN30)
58	1	25393	KEY
59	8	939262	CAPSCREW
60	2	32840	BUSHING
61	1	21556	HOUSING
62	8	20520	LOCKWASHER
63	8	20274	NUT
64	3	20286	PIPE PLUG
65	1	939269	LEFT FRAME
66	1	20293	RIGHT FRAME
67	2	20098	KEY
68	1	22443	SHAFT
69	2	32839	BUSHING
70	2	20574	KEY
71	10	21157	CAPSCREW
72	2	22438	CARRIER
73	1	20569	SPACER
74	2	164056	PIN
75a	1	21643	RIGHT HAND GEAR
75b	1	21642	LEFT HAND GEAR
76a	1	20127	MODEL 34 COVER
76b	1	44030	RUFNEK 30 COVER
77	1	26799	BREATHER

BILL OF MATERIAL CONTINUED

SEQ	QTY	P/N	DESCRIPTION
78	4	20268	CAPSCREW
79	2	20326	GASKET
80	10	20519	LOCKWASHER
81	10	20273	NUT
82	1	20279	KEY
83	1	29503	BRAKE DRUM
84	1	20115	LOCKWASHER
85	1	20114	LOCK NUT
86	2	1733	BRAKE SHOE
87	1	3568	CAM PLATE
88	1	43962	BRAKE HOUSING
89	16	40546	CAPSCREW
90	1	44050	OIL SEAL
91	1	43964	BRAKE HOUSING
92	1	25519	KEY
93	1	44151	O-RING
94	8	20522	CAPSCREW
95	1	13050	BREATHER
96	1	43966	BRAKE COVER
97	1	41406	ADJUSTING NUT
98	1	43960	SPRING PLATE
99	1	41411	O-RING
100	2	21684	PLUG
101	1	44150	BRAKE DRIVER
102	1	44145	RETAINING RING
103	6	33564	FRICTION DISC
104	11	44141	STATOR PLATE
105	1	33559	SPRING
106	1	29084	RETAINING RING
107	1	33565	CAM CLUTCH
108	1	44142	COUPLER
109	1	12208	BUSHING
110	1	20118	GASKET
111	1	4362	YOKE ASSEMBLY W/ POSITION INDICATOR
112	1	40432	MOTOR ADAPTER
113	1	40147	GASKET
114	2	13529	CAPSCREW
115	2	41000	WASHER
116	1	40275	MOTOR
117	1	996547	OIL SEAL

TORQUE SPECIFICATIONS CHART

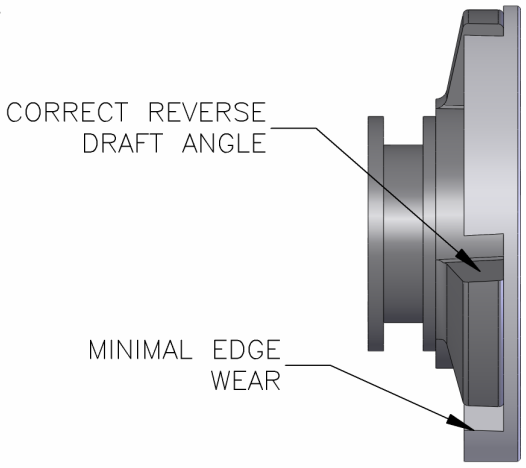
		Dry	Plated	Lubricated	Dry	Plated	Lubricated
		SAE Grade 5	SAE Grade 5	SAE Grade 5	SAE Grade 8	SAE Grade 8	SAE Grade 8
Nominal	Size	Torque *(Ft-Lbs)	Torque *(Ft-Lbs)	Torque *(Ft-Lbs)	Torque *(Ft-Lbs)	Torque *(Ft-Lbs)	Torque *(Ft-Lbs)
1/4	**20**	**8**	**6**	**5**	**12**	**9**	**7**
1/4	**28**	**10**	**7**	**6**	**14**	**10**	**8**
5/16	**18**	**17**	**13**	**10**	**25**	**18**	**15**
5/16	**24**	**19**	**14**	**11**	**27**	**20**	**16**
3/8	**16**	**31**	**23**	**19**	**44**	**33**	**26**
3/8	**24**	**35**	**26**	**21**	**49**	**37**	**30**
7/16	**14**	**49**	**37**	**30**	**70**	**53**	**42**
7/16	**20**	**55**	**41**	**33**	**78**	**58**	**47**
1/2	**13**	**76**	**57**	**45**	**106**	**80**	**64**
1/2	**20**	**85**	**64**	**51**	**120**	**90**	**72**
9/16	**12**	**109**	**82**	**65**	**153**	**115**	**92**
9/16	**18**	**122**	**91**	**73**	**172**	**129**	**103**
5/8	**11**	**150**	**113**	**90**	**212**	**159**	**127**
5/8	**18**	**170**	**128**	**102**	**240**	**180**	**144**
3/4	**10**	**266**	**200**	**160**	**376**	**282**	**226**
3/4	**16**	**297**	**223**	**178**	**420**	**315**	**252**
7/8	**9**	**430**	**322**	**258**	**606**	**454**	**364**
7/8	**14**	**474**	**355**	**284**	**668**	**501**	**401**
1	**8**	**644**	**483**	**386**	**909**	**682**	**545**
1	**14**	**721**	**541**	**433**	**1019**	**764**	**611**
1-1/8	**7**	**794**	**596**	**475**	**1288**	**966**	**772**
1-1/8	**12**	**890**	**668**	**534**	**1444**	**1083**	**866**
1-1/4	**7**	**1120**	**840**	**672**	**1817**	**1363**	**1090**
1-1/4	**12**	**1241**	**930**	**745**	**2012**	**1509**	**1207**

T = BOLT TORQUE (LB. FT.) **T = (KWD) / 12**
K = TORQUE COEFFICIENT (K **= 0.20 DRY** **K = 0.15 PLATED** **K = 0.12 LUBRICATED)**
W = PRELOAD TENSION
D = NOMINAL BOLT SIZE (IN.) *** ALL TORQUE VALUE TOLERANCES ARE ± 5%**

CLUTCH INSPECTION

GOOD

THIS PICTURE ILLUSTRATES A SLIDING & DRUM CLUTCH WITH THE PROPER REVERSE DRAFT AND MINIMUM EDGE WEAR

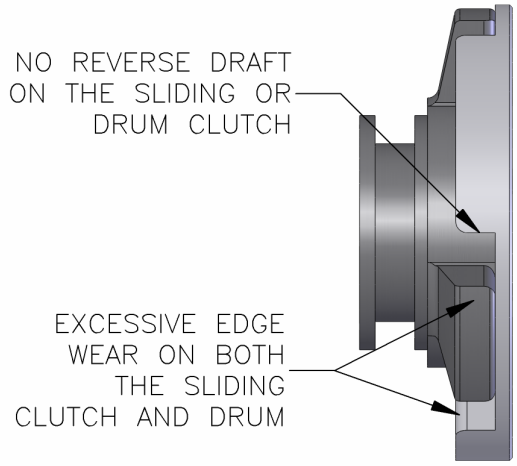


BAD

NOTICE

THE REVERSE DRAFT ENSURES THE CLUTCH STAYS ENGAGED DURING PAY–IN.

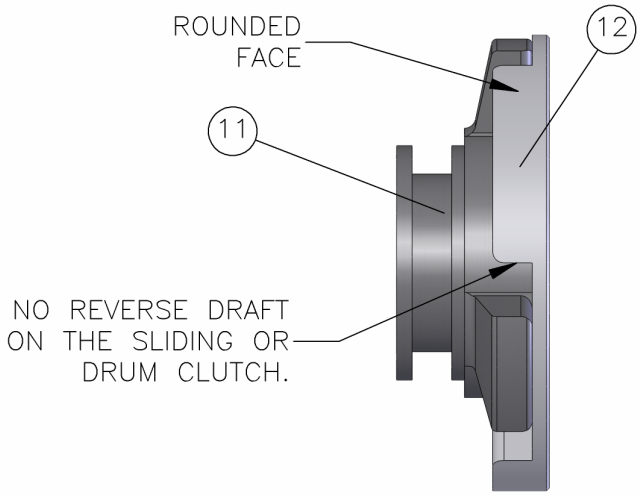
WITHOUT THE CORRECT DRAFT, THE CLUTCH COULD DIS–ENGAGE UNPREDICTIBLY.



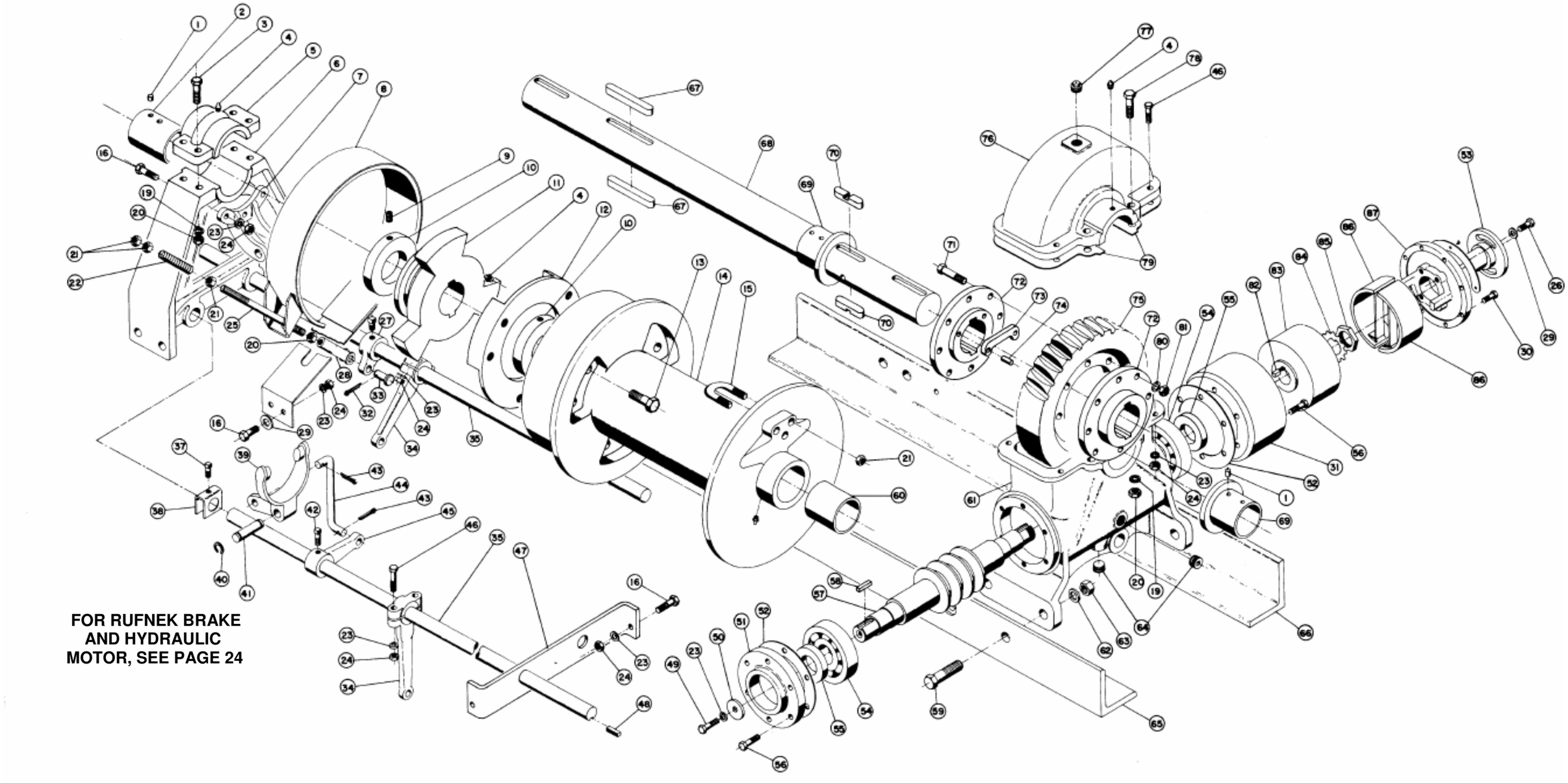
CLUTCH REPLACEMENT CRITERIA

⚠ WARNING

IF 1/4 OF THE SURFACE OF THE FACE ON THE SLIDING CLUTCH OR DRUM CLUTCH IS ROUNDED OR HAS NO REVERSE DRAFT THE SLIDING CLUTCH AND OR DRUM CLUTCH MUST BE REPLACED.

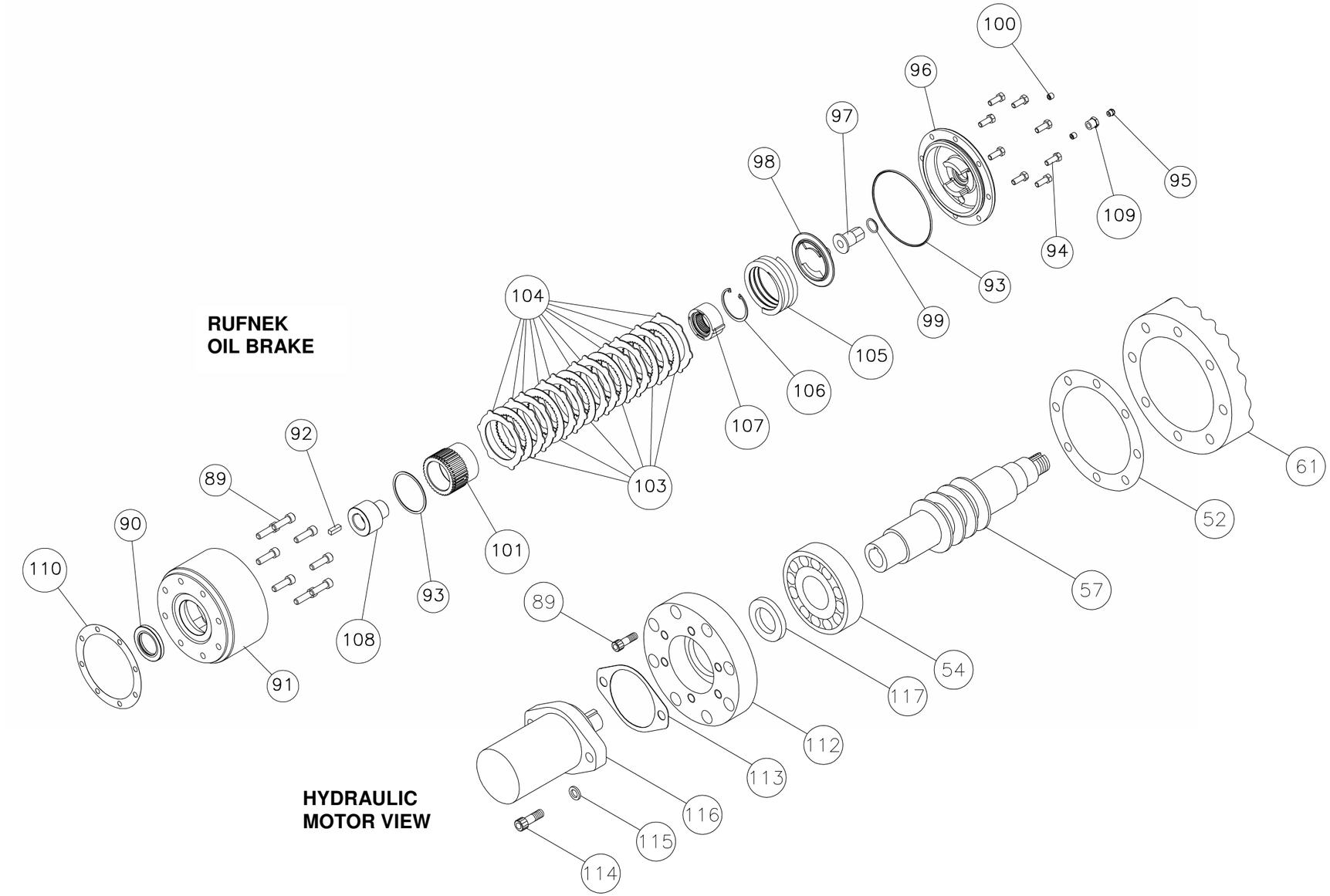
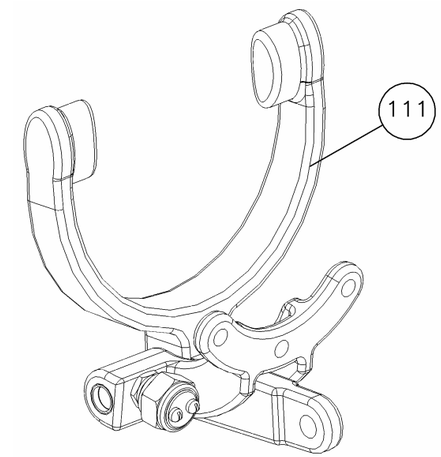


ISOMETRIC VIEW



FOR RUFNEK BRAKE AND HYDRAULIC MOTOR, SEE PAGE 24

RUFNEK BRAKE, HYDRAULIC MOTOR, & CLUTCH POSITION INDICATOR



CLUTCH POSITION INDICATOR KIT